

choosing to compete: building an environment to support knowledge-based innovation and growth

Massachusetts has undergone a profound economic transition over the past twenty years. Our old manufacturing base steadily lost much of its competitive edge. By necessity as much as by choice, we adapted to the “New Economy” of knowledge-intensive production, high-tech innovation, and global trading. Massachusetts had long been a center of science and technology. Only over the last two decades, however, has knowledge-based innovation become the foundation of our overall economic well-being.¹

In recent years, there has been much discussion of the “New Economy.” Recent experience shows that it is not simply about Internet startups, which flourished in the late 1990s but failed in the early years of the new century. Rather, the “New Economy” is about consistent and fundamental changes that have permanently altered the way in which wealth is created. Rapidly advancing technologies are transforming industries, firms, and the nature of work. In this environment, ideas and knowledge increasingly determine competitive advantage and we are still adapting to these changes. Markets and competition are increasingly global in scope. As such, the transition to the “New Economy” has implications for industry, our workforce, and government.

Today, Massachusetts is widely acknowledged as a leader in the new, knowledge-based economy.² This orientation, however, raises a new set of challenges for the Commonwealth. Our State economy has been quite volatile, and not all regions and citizens

have adapted successfully. Continued progress requires well-targeted educational and infrastructure investments and a more active role for State government in the economic development process.

This Report proposes strategic priorities and policy options that are designed to promote and inform a healthy debate around the economic future of the Commonwealth and its regions. It highlights a strategic framework – supported by data and information – that can be used by public and private sector leaders to develop policies that target limited resources to areas of greatest need.

Our intent is to spark a spirited and constructive conversation on the role of State government and key priorities going forward.

¹ Lynn E. Browne and Steven Sass, “The Transition from a Mill-based to a Knowledge-based Economy: New England, 1940-2000,” Peter Temin, ed., *Engines of Enterprise: An Economic History of New England*. (Cambridge: Harvard University Press, 2000).

² Three organizations placed the Commonwealth at the top of their most recent “New Economy Index” –the Progressive Policy Institute for 1999, the Meta Group for 2000, and the Milken Institute for 2001. See the Progressive Policy Institute Web site, <http://neweconomyindex.org/States/massachusetts.html>, the Meta Group, *Metricnet States New E-Economy Index 2000* (Stamford CT, 2001), and Milken Institute Web site, <http://www.milkeninstitute.org/poe.cfm?point=ecoindex>.

The Great Transition

Since the Industrial Revolution of the early nineteenth century, Massachusetts earned its keep by selling manufactured goods to the U.S. market. Blue-collar workers, in multi-story brick factories, in industrial cities and towns found in nearly every corner of the Commonwealth, generated the bulk of the income flowing into the State. This manufacturing economy grew up along rushing streams once needed for power. It extended along rail lines connecting its mills and machine shops to the national market. As recently as 1984, manufacturing establishments employed 675,000 workers, about 24 percent of our workforce. Manufacturing, however, has since shed over 250,000 jobs and now accounts for just under 13 percent of employment in the Commonwealth.³

As manufacturing receded, a new knowledge-based economy emerged. The services sector, which includes universities, hospitals, software developers, and management consulting firms (among many other enterprises) added 470,000 jobs since 1984 and jumped from 26 to 37 percent of total employment. Finance, insurance, and real estate, which includes money managers, mutual fund distributors, and venture capitalists added 50,000 jobs and went from 6.3 to 6.9 percent of employment (see Figure 1-1). Even in manufacturing, our workforce has changed. Many Massachusetts firms have automated, eliminated, or outsourced a great deal of shop-floor production and now employ, proportionately, far more managers, engineers, and technicians.⁴

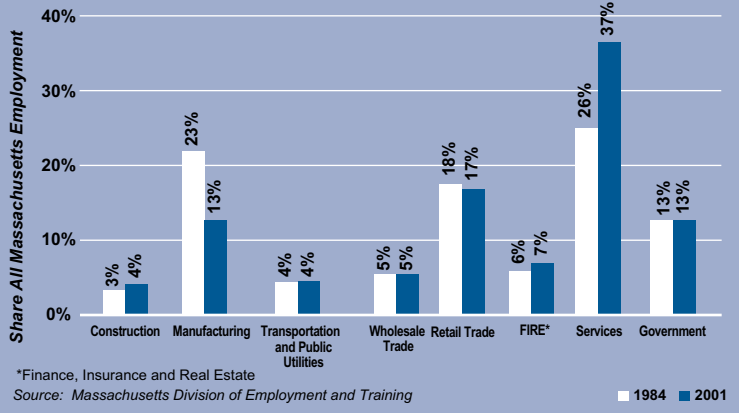
A new “built” landscape has emerged to accommodate this expansion of the knowledge-based economy. Modern office towers, R&D facilities, and up-scale housing developments and retail malls have superceded the red brick factory buildings, commercial blocks, and wood-frame three-deckers. Rather than locate in our smaller industrial cities and towns scattered across the Commonwealth, these new buildings sprang up in downtown metropolitan areas – primarily in Boston, and along our major highways – where people and ideas can move rapidly from one place to another.

Such a profound transition inevitably has far-reaching implications for the role of State government. It took a major economic downturn, however, for these new responsibilities to come clearly into focus.

That downturn began at the end of 1989, and ran through the early years of the 1990s. The crash of a speculative real estate and construction boom, fueled by the need to build-out space for the new knowledge-based economy, was the initial blow. It led to the collapse of one of our largest banks and a credit crunch that seriously impaired our ability to regroup. More fundamental were the sharp declines in output and employment in defense and computers – the two leading manufacturing industries through much of

figure 1-1

The shift from manufacturing to knowledge-based services employment by industry: 1984 and 2001



the post-World War II era. When combined with the effects of the relatively mild 1990-91 national recession, eleven percent of all jobs in the Commonwealth disappeared between 1989 and 1992⁵ (see figure 1-2 on next page).

The most powerful shock came from the rapid decline of the Massachusetts computer industry. In time, the national recession and the local crisis in real estate and banking would pass. Our problems in defense reflected a nationwide cut in military spending that came with the end of the Cold War. But the troubles in computers were different. Here we lost a decisive head-to-head competitive struggle with Silicon Valley. The PC, developed by Intel, Microsoft, Apple, and other Silicon Valley firms, clearly stole the thunder from the Commonwealth’s vaunted minicomputer manufacturers.

AnnaLee Saxenian and her influential book, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*,⁶ expressed a widely held anxiety that this defeat reflected a significant competitive flaw. The underlying fear was that high-tech flourished far better in California’s fluid, open culture with its abundance of small inter-networked firms, than in traditional and hierarchical Massachusetts corporations. In high-tech markets, the winner generally captures the bulk of the profits. So Saxenian argued that the Commonwealth would forever lag this younger and hipper rival. And by the early 1990s, high-tech business confidence in the future of the Massachusetts economy had all but vanished (See Figure 1-3 on next page.)

³ Massachusetts Division of Employment and Training, <http://www.detma.org/lmi/dataprogram.htm>.

⁴ Ibid.

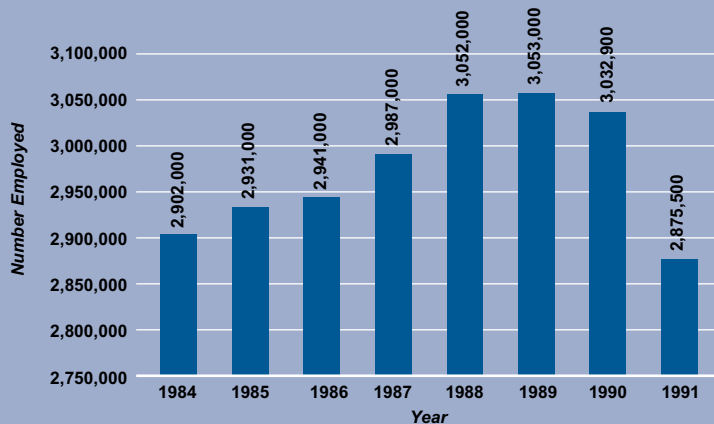
⁵ Ibid.

⁶ (Cambridge: Harvard University Press, 1994).

In the midst of this transition, the recession of the early 1990s sent a shockwave through the Commonwealth:

figure 1-2

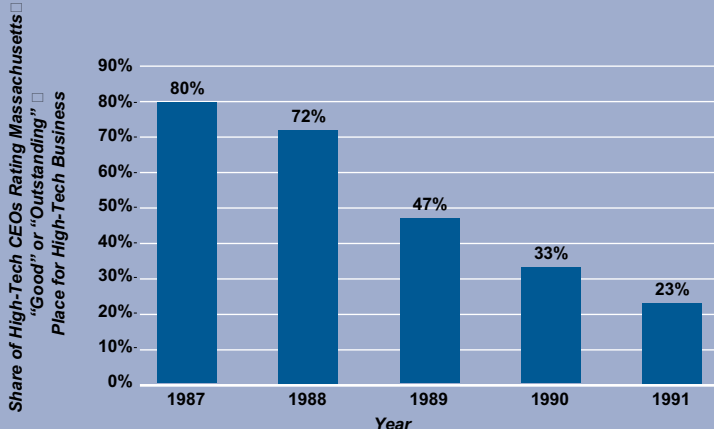
Employment fell rapidly...



Source: Massachusetts Division of Employment and Training

figure 1-3

...and high-tech business confidence plummeted



Source: Mass High Technology Council, as reported by the Mass Technology Collaborative

Choosing to Compete

The government of the Commonwealth, under the leadership of Governor Weld, responded by launching a major strategic review of the Massachusetts economy and its own economic development initiatives. The Massachusetts Executive Office of Economic Affairs and The University of Massachusetts assumed leadership of this initiative. They reached out to business leaders and intellectual resources across the Commonwealth. They involved academics and experts in public agencies and solicited white papers on key policy issues such as workforce development and land-use.⁷ They also organized regional meetings to identify opportunities and challenges in the distinct regional economies of the Commonwealth.

Professor Michael Porter, of the Harvard Business School, emerged as an important advisor. His recent work, *The Competitive Advantage of Nations*, offered a powerful framework for addressing the challenges faced by the Commonwealth. Porter saw the continued expansion of the global marketplace as steadily intensifying competitive pressures on existing industries. Porter's key lever of success was constant innovation. And innovation flourished best, he observed, in vibrant, geographically concentrated "industry clusters." (see sidebar *Michael Porter's Cluster Theory of Competitiveness*, on right)

Porter and his colleagues at the Monitor Group supported these conclusions with major reports on *The Competitive Advantage of Massachusetts*⁸ and *Toward a Shared Economic Vision for Massachusetts*.⁹ They identified the Commonwealth's universities as critical economic assets, knowledge-based activities as the new foundation of the State's economy, and knowledge-based industry clusters as the critical engines of competitive success. The battle between the Massachusetts and Silicon Valley-based computer clusters was thus a harbinger of things to come. But unlike Saxenian and other skeptics, Porter saw Massachusetts as well positioned to compete in such high-value knowledge-based activities. The remaining task for the Commonwealth was to develop a strategy that leveraged our critical advantages, shored up our deficits, and created an infrastructure to support adaptive, innovative enterprises.

The Executive Office of Economic Affairs and the University of Massachusetts presented such a strategy in their 1993 report *Choosing to Compete: A Strategy for Job Creation and Economic Development*. The document clearly identified the State's need for a knowledge-based economic strategy, and laid out an agenda for strengthening the Commonwealth's economic position. The Report followed a carefully structured approach for defining the Commonwealth's new role. It defined:

Our economic development objectives

Choosing to Compete highlighted five key economic objectives:

- High and rising real incomes (incomes adjusted for inflation)
- Job growth
- Strong regional economies within the Commonwealth
- Broad economic opportunity
- A high quality of life

Our strengths, weaknesses, and opportunities

Choosing to Compete recognized that defense and minicomputers, the old drivers of the Massachusetts economy, would not bounce back with the return of prosperity. The Commonwealth's distinctive economic strength still lay in our great universities, highly educated workforce, and vigorous entrepreneurial tradition. So the central question, as *Choosing to Compete* put it:

"...was whether the high-tech boom has ended in Massachusetts, or merely stumbled badly. If the high tech boom is limited to a group of industries focused on minicomputers and defense, then the answer is probably the

former. However, it is also possible that the minicomputer- and defense-dominated high tech boom was merely part of a larger and deeper phenomenon – that is, the successful application of advanced research to an ever-broadening array of commercial opportunities and the creation of an environment supportive of rapid, technologically-based innovation.”¹⁰

The answer was clearly the latter, and it was this “array of commercial opportunities” that held out the best prospects for our future.

Our initiatives that promised the greatest incremental value

Choosing to Compete proposed a new economic development agenda for State government centered on “the creation of an environment supportive of rapid, technologically-based innovation.” Thus, the State remains responsible for our physical infrastructure. Yet, roads and airports that move people and communications links that move information would now often take precedence over transportation facilities that move manufactured goods. An “environment supportive of rapid, technologically-based innovation” also requires a responsive education and training system. Innovative enterprises need skilled employees; workers need the high-paying jobs these employers offer; and the State has a clear role to play in bridging this gap with its community and State colleges, universities, and other education and training programs. The Commonwealth also had to overcome a legacy of high taxes, ineffective regulation of important economic programs, and a general attitude of suspicion toward business. The realities of the global competitive marketplace required a stable fiscal environment, a high level of government expertise and efficiency, and a far more cooperative relationship with business.

Our specific recommendations, clear objectives, and performance measures

Choosing to Compete then presented a series of proposals to implement this new strategy. These included reforms of the unemployment compensation system, recommendations on coordinating our education, research, and training facilities with the needs of workers and businesses, suggestions for streamlining regulatory and permitting processes, and initiatives for delivering State services and economic development assistance more effectively. *Choosing to Compete* also emphasized regional differences and the need for economic development initiatives to be sensitive to local conditions (see sidebar, *The Seven Economies of the Commonwealth, Each With Distinct Opportunities and Challenges* at end of chapter).

The publication of *Choosing to Compete* and the planning process that preceded it significantly improved the dynamics of the political debate in the Commonwealth. Instead of struggling over the division of the State’s dwindling resources – which is all too common in difficult economic times – the effort framed “an inquiry into how those resources might be better invested in our future.”¹⁰ Perhaps most importantly, it clearly identified a new role for State government as an active participant in the new knowledge-based economy.

Michael Porter’s “Cluster Theory of Competitiveness.”

Michael Porter, of the Harvard Business School, developed a “cluster” theory of economic competitiveness that had a major impact on policy-making in the Commonwealth. In the *Competitive Advantage of Nations*, and later in the *Competitive Advantage of Massachusetts*, Porter argued that no State could compete effectively in all export industries. Rather, States must focus on a few key “clusters,” or “geographic concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field.”¹³ Porter’s conception of “cluster” cuts across traditional industry classifications to include an industry’s suppliers, specialized infrastructure providers, and supporting governmental institutions, research universities, and trade associations. Prominent examples include pharmaceuticals in New Jersey, films in Hollywood, and wine in certain regions in California.

Clusters succeed because they are big enough to support a broad array of specialized suppliers. A large number of firms also generates diversity and the competitive pressures needed to build critical innovative capacity. Porter’s model identifies four issues that largely determine a cluster’s overall innovative and competitive potential:

Factor conditions - The availability of workers, capital, and physical, scientific, and technological infrastructure customized to the needs of the particular industry.

Demand conditions - The presence of a sophisticated local customer base that provides the innovative push needed to develop high-value products responsive to customer needs.

Context for firm strategy and rivalry- A system of rules, incentives, and competitive pressures that protect intellectual property, encourage investment, and spur firms to upgrade their operations.

Related and supporting industries- A rich network of suppliers, specialized professional and technical support firms, and industry associations that lower transaction costs, promote the exchange of ideas, and create flexible outsourcing opportunities.

⁷ Among the studies that contributed to the strategic review of the early 1990s were “overall economic development plans” (OEDPs) prepared by a number of regional planning agencies for the federal Economic Development Administration; “Workforce Development Policy Blueprints” written for the MassJobs Council by sixteen regional employment boards; regional land use strategies, such as the *Regional Policy Plan* for Cape Cod and *MetroPlan 2000* for Boston; and special studies, such as *The High Skills Path for Southeastern Massachusetts*. For a full listing of the sources and participants, see *Choosing to Compete*, pp.186-192.

⁸ Cambridge: Monitor Corporation, 1991.

⁹ Cambridge: Monitor Corporation, 1992.

¹⁰ *Choosing to Compete*, p.13.

¹³ Institute for Strategy and Competitiveness, Harvard Business School, <http://www.isc.hbs.edu/econclusters.htm>

A re-focused Massachusetts economy roared back after the bitter years of the 1990s:

figure 1-4

Employment surged...

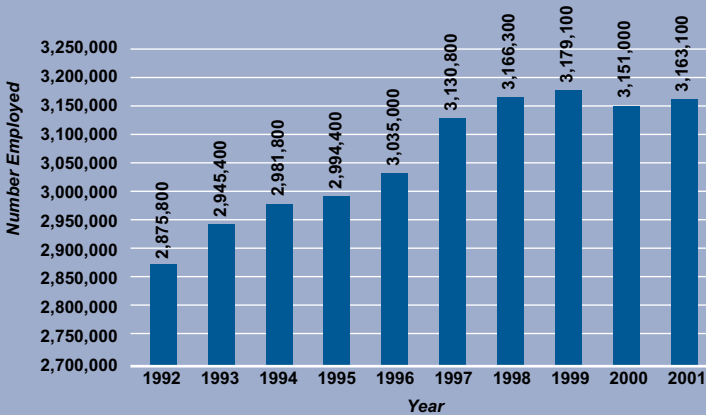
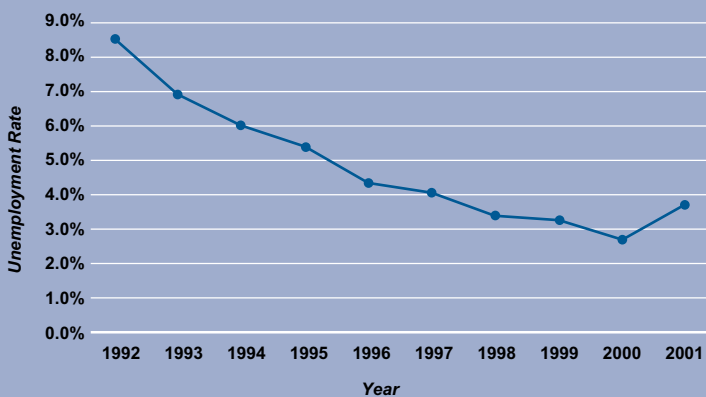


figure 1-5

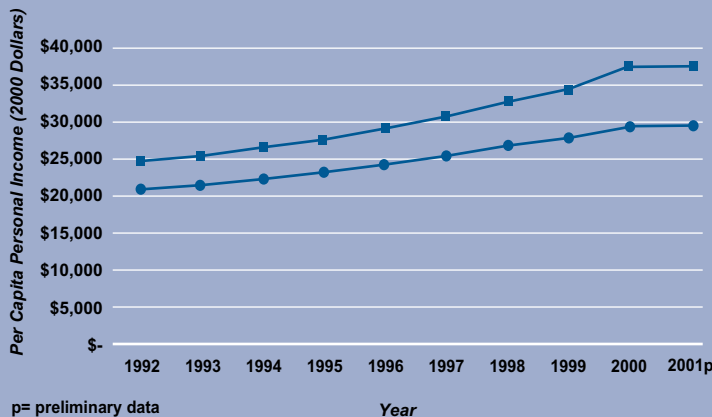
Unemployment plummeted...



Source: Massachusetts Division of Employment & Training

figure 1-6

...and real income per capita rose smartly



p= preliminary data

Source: US Bureau of Economic Analysis

United States Massachusetts

A Revitalized Massachusetts Economy

Given the Commonwealth's difficult economic position in the early 1990s, what followed was a remarkable economic resurgence. Unemployment fell to just 2 percent of the workforce by the end of 2000, far lower than the national 3.7 percent rate. Employment had grown at an annual average rate of 2.3 percent since the end of 1993, essentially the same as the nation's 2.4 percent rate. And per-capita real income grew more briskly in Massachusetts than in the nation as a whole. Not all aspects of the economy performed as well, however. Median household income remained at its 1993 level and both population and labor force growth have been extremely sluggish.¹¹ Taken as a whole, however, the rebound is clearly impressive (see figures 1-4, 1-5 and 1-6).

The primary credit for the 1993-2000 expansion lies within the private sector, as the people of Massachusetts found powerful new ways to create value in the marketplace. In the critical high-tech sector, our gritty entrepreneurs created new firms. Our resourceful engineers, managers, technicians, and production workers developed new skills and even learned new professions. Together, they developed what have essentially become new leading industries in communications and networking, enterprise software and services, biotechnology, and pharmaceuticals. Firms in traditional industries such as tourism, investment management, health care, and consulting also targeted new customers and found new ways to serve old ones.

The State's new initiatives have also contributed to our success. The Commonwealth's education and training programs, research institutions, and regulatory and permitting agencies have become more responsive to the needs of entrepreneurs and workers alike. As a result, there has been a sharp improvement in the business climate of the Commonwealth (see figure 1-7). Our infrastructure, moreover, continues to improve, with the Big Dig, renovations at Logan International Airport, and major capital improvements to schools, roads, and bridges throughout the Commonwealth either completed or scheduled to be complete within the next few years. While State government continued to achieve a higher level of performance and investment, it also significantly reduced taxes and fees and supported the prudent expansion of the State's rainy day fund (see Figure 1-8).

Economic development is a long-term process and requires constant care and attention. The full effects of these new initiatives will be felt over time. What is clear, however, is that State government has become a vital contributor to our knowledge-based economy, helping to build long-term competitive advantage. While much remains to be done, the Commonwealth is far better positioned today to meet the challenges of a dynamic future than it was in 1993.

¹¹ Massachusetts Division of Employment and Training, <http://www.detma.org/lmi/dataprogram.htm> and Andrew Sum, Mykhaylo Trubb'sky, Neeta Fogg, and Sheila Palma, *The Annual Earnings of Workers in Massachusetts and the United States: An Assessment of Trends in the Level and Distribution of Earnings Over the 1979-2000 Period* (Boston: Center For Labor Market Studies, December 2001).

A Strategic Framework for Economic Development

This Report is the product of a fresh strategic review of the State's economic development initiatives as conducted by the Massachusetts Department of Economic Development with extensive research, analytical, and technical support provided by the University of Massachusetts system and coordinated by the UMass Donahue Institute. Like the effort of the early 1990s, extensive outreach was undertaken to enlist the participation of academic experts, business and labor leaders, community groups, and knowledgeable individuals throughout the Commonwealth. With their help, we identified key economic trends and related leverage points in the new knowledge-based economy and developed a strategic framework that is designed to identify the key economic policy challenges before us. This Report also offers a set of policy options that are intended to serve as resources for business leaders and policymakers as they work together to shape our economic future. A list of contributors and conference participants appears at the end of this Report. Without their input, this document could not have been written.

What follows in Chapter 2 is a review of the Massachusetts economy since 1993, which focuses on the dynamics of economic development. Chapter 3 examines our progress and offers a vision for economic development. Chapter 4 offers a strategic framework for economic development. Part II profiles the seven economic regions of the Commonwealth. Chapters 5-11 highlight the unique characteristics of each region and identify their most pressing economic issues. Part III offers a set of specific policy options designed to provide business leaders and policymakers with tools that can be used to realize a shared vision. Policy options are clearly connected with major economic development goals and performance measures that are designed to help track progress towards achieving these goals. Also included is a description of our statewide planning process as well as a list of those who participated in the effort.

This Report appears at a difficult juncture. Massachusetts, along with the nation, is emerging from a recession that began in March, 2001. Employment growth has all but ceased and unemployment jumped more than two full percentage points, from 2.3 percent at year-end 2000 to 4.4 percent in May, 2002.¹² Job losses have disproportionately affected high-paid positions in our export industries – jobs that bring significant amounts of income into the Commonwealth and support the livelihoods of many other workers and their families. The exuberant optimism of the late 1990s has thus been replaced by a cautious concern about what the future might bring.

Planning for economic development is a long-term process. It is not a response to an immediate crisis. A comprehensive framework for economic development can nevertheless help Massachusetts regain its bearings. It is a reminder that recessions eventually end. Only the nastiest national downturns in the

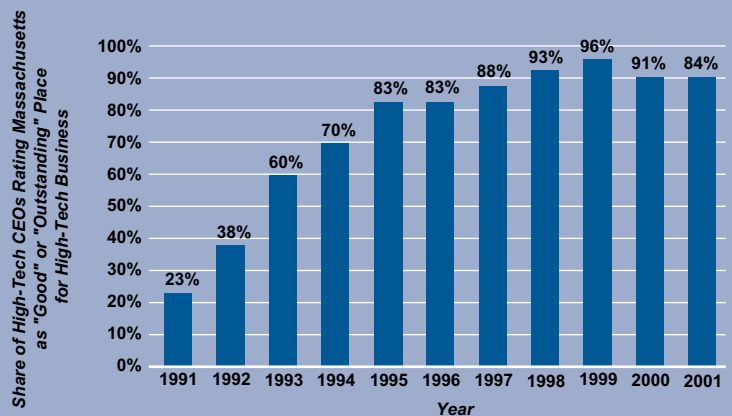
post-war period have lasted two years and most were over in twelve months or less. The Commonwealth is clearly exposed to the slump in IT spending and high-tech investing and to the shock to the national and global economies caused by September 11th. But neither our export sector nor our financial system has been hit as hard as they were in the economic downturn of the early 1990s.

The crucial message of *Toward a New Prosperity* is to focus on the future, while learning from the past. In times of uncertainty, a long-term perspective is critical. We need to identify what the Massachusetts economy should look like in the future and then direct the State's limited resources to getting there quickly and efficiently. Now is the time to effectively address our major problems and significantly enhance the competitive position of Massachusetts and our regions.

Two indicators of our strengthened strategic position:

figure 1-7

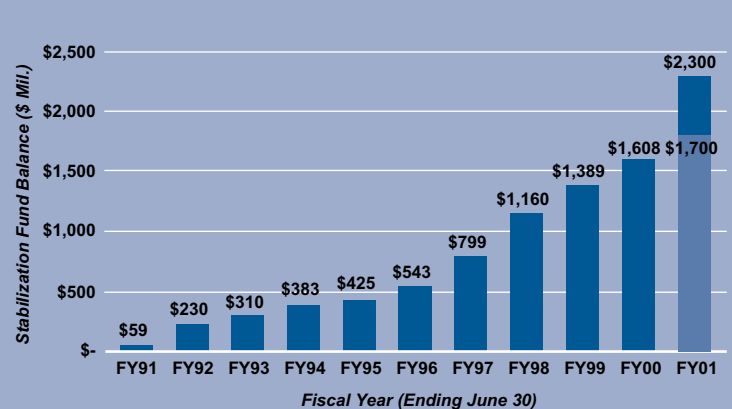
Smart rebound in business confidence...



Source: Mass High Technology Council

figure 1-8

... and the prudent buildup of a rainy day fund



Source: Massachusetts Executive Office of Administration and Finance

Note: FY01 figure includes \$579 million set aside in transitional escrow account

¹² Massachusetts Division of Employment and Training, <http://www.detma.org/lmi/dataprogram.htm>. Andrew Sum, Center for Labor Market Studies, Northeastern University.

The Seven Economies of the Commonwealth

The map of Massachusetts runs from east to west. Our hills, rivers, and coastline, however, generally run north to south and divide the Commonwealth into seven distinct regional economies. In many ways, each needs to develop its own economic development strategy.

Greater Boston - From the earliest days of European settlement, Boston has been the seat of government and the State's primary international port. The city and its surrounding area have remained the largest metropolitan area of the Commonwealth, with nearly half our total population and over half our total employment. It is home to many of Massachusetts' most important civic, commercial, and industrial institutions. Recent explosive growth in key technology clusters has moved development patterns west from the Route 128 beltway to the Interstate 495 corridor.

Northeast - The Merrimack River, running along the northeastern border of the Commonwealth, powered the huge red brick textile mills of Lawrence and Lowell and once made Massachusetts the national center for textile manufacturing. Over the last fifty years, the Northeast has emerged as a major center for high-tech manufacturing. In the 1990s, the region became a major equipment supplier for the telecommunications revolution that flourished during the decade.

Southeast - Coastal cities such as New Bedford and Fall River, inland industrial cities such as Brockton, and concentrations in fishing, textiles, and shoes had given the Southeast region a diverse industrial base. The decline of these traditional industries has been difficult, especially for residents with relatively low educational attainment. Areas closest to Greater Boston have benefited from their proximity to that region's strong economy.

Cape Cod and Islands - The sea dominates the economy of Cape Cod, a marvelously unique peninsula jutting far into the Atlantic, plus the two islands off its south coast—Martha's Vineyard and Nantucket. The region has become a global tourist destination and a favorite location for retirement homes. It is also the fastest growing region in the Commonwealth in terms of employment and population.

Central - Rolling hills separate Greater Boston from the Blackstone River watershed, running from Leominster and

Fitchburg to Worcester, then south to Providence, Rhode Island on the coast. The lower reaches of the Blackstone Valley were the first home of the American Industrial Revolution and the Central region remains one of the most important manufacturing districts in the Commonwealth. The emergence of Biotech in Worcester and the use of new communications technologies in traditional manufacturing industries illustrate the importance of knowledge-based initiatives in the region.

Pioneer Valley - The Connecticut River, running between Vermont and New Hampshire, down through Springfield and Hartford, Connecticut, and then to the coast, is the largest river in the Commonwealth. America's machine-tool industry grew up along its banks, as did many important insurance firms. Today, its industrial composition is much like that of the State as a whole. While areas such as Franklin County retain high concentrations of manufacturing employment, software developers have begun to settle in the scenic countryside and the region boasts a thriving tourism business.

The Berkshires - The Housatonic River, at the western end of the Commonwealth, runs through much of Berkshire County before flowing through Connecticut to the Long Island Sound. The region, the least populous in the Commonwealth and the only one to lose population in the 1990s, struggled to find a new economic base after the departure of major electrical equipment manufacturers but shows evidence of growing economic activity in technology enterprise. Tourism continues to be a major export activity.